To the Editor-10-second ECG-based RMSSD as valid measure of HRV

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A 10-second ECG-based Root Mean Square of Successive Differences is a valid and reliable measure of heart rate variability

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We thank Lombardi et al.[1] for highlighting the relevance of our paper[2] in their editorial comment, but strongly disagree with their conclusion that the results of our study based on short-term heart rate variability (HRV) are "difficult to interpret". We initially shared the same skepticism and concerns regarding the utility of ultra-short HRV measurements based on 10-second ECGs, which is why we set out to extensively test this in a validation study[3] prior to using 10-second Root Mean Square of Successive Differences (RMSSD) in our recent publication[2]. To validate, we assessed RMSSD from three separate 10-second recordings and gold standard measurements of 4 to 5 minutes and found substantial agreement (r=0.853 to 0.862) with only minimal deviation from the true mean, and short-term reproducibility for the 10-second recordings ranging from r = 0.740 to 0.751.[3] Thus, we conclude that a single 10-second ECG recording yields a valid RMSSD measurement with good reliability.

As such we do not believe, as stated by Lombardi et al.[1], that the negative findings for psychosocial factors were mainly caused by the use of ultra-short HRV measurements. Furthermore, in contrast to Lombardi et al's view, we did consider instantaneous heart rate by additionally conducting all analyses on a measure of RMSSD adjusted for heart rate by the coefficient of variation, a parsimonious correction formula[2]. Subsequently, our very large cohort study confirmed the well-known strong cross-sectional associations between RMSSD and antidepressant medication use, type-2 diabetes, and hypertension. Increased future application of RMSSD based on 10-second ECGs in prospective epidemiological studies may yield important new findings related to the development of cardiovascular morbidity and mortality.

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